

CLAIMS

1. A valve timing adjusting device comprising:

a first rotor that integrally fixes a housing having the bearing of a camshaft, a case internally having a plurality of shoes projecting therefrom and having hydraulic chambers formed between the shoes, and a cover covering the hydraulic chambers, and that rotates integrally with a crank shaft;

a second rotor that has a plurality of vanes each dividing the hydraulic chamber into an advanced-angle hydraulic chamber and a retarded-angle hydraulic chamber, can rotate through a predetermined angle within the first rotor, and is integrally fixed with an intake or exhaust camshaft;

energizing means for adjusting the relative position between the first rotor and the second rotor;

a groove provided on the opposite side of the shoe to the housing to accommodate one-end side of the energizing means; and

a hole or a groove provided in the vane of the second rotor to accommodate the other-end side of the energizing means.

2. A valve timing adjusting device according to Claim 1, wherein the groove accommodating the energizing means is molded by a mold.

3. A valve timing adjusting device according to Claim 1, wherein the position at which the energizing means becomes

straight is positioned in the vicinity of the position at which the length of the energizing means becomes the maximum.

4. A valve timing adjusting device according to Claim 1, wherein a clearance is created between the shoe and the vane when the energizing means is maximally compressed.

5. A valve timing adjusting device according to Claim 1, wherein a plurality of the energizing means are equally loaded and are disposed at a substantial equiangular space between the shoe and the vane.